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Go Wild with Fruits and Veggies: Engaging Children in Nutrition Education and Physical Activity with Animal Characters

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Abstract: The Go Wild with Fruits and Veggies! curriculum incorporates wild animal characters to motivate 3rd-5th grade children to increase fruit and vegetable intake and physical activity. Positive findings from a rural setting regarding a self-reported increase in intake of vegetables (n=1,285) were verified by more intensive evaluation of vegetable intake in an urban setting (n=140) that compared treatment and control groups. No differences in changes in physical activity were noted between groups. These results demonstrate

the effectiveness of the curriculum based on the use of animal characters to role model positive behaviors and different evaluation methods to corroborate findings.

Background

Few children in the U.S. are meeting daily recommendations for intake of fruit and vegetables, especially those in deep yellow, green, and orange groups (Kimmons, Gillespie, Seymour, Serdula, & Blanck, 2009). In addition, only 34.7% of U.S. students are meeting physical activity recommendations (CDC, YRFSS, 2007).

Previous Extension education delivered in schools has focused on changing eating behaviors among children. Ryan, Anderson, and Sherman (1995) reported that Extension nutrition education involving students, teachers, and parents resulted in improved intake of fruits and vegetables by K-6 grade children. Jenson, Kattelman, and Ren (2009) showed improvement in nutrition behaviors in 5th-6th grade students following hands-on, school-based nutrition education based on Bandura's (1986) social cognitive theory (SCT). However, few Extension curricula exist for young children that focus on both diet and physical activity, which are complementary components of overall health.

A key behavioral outcome of the Supplemental Nutrition Assistance Program Education (SNAP-Ed) is increasing fruit and vegetable intake (USDA, FNS, OANE, 2005). According to SNAP-Ed guidelines, nutrition education should use personally relevant, interactive methods. One approach to enhance relevancy in nutrition education has been the use of cartoon characters to model recommended behaviors. For example, fruit and vegetable intake increased among 5-11-year-old children after modeling by cartoon characters (Horne, Tapper, Lowe, Hardman, Jackson, & Woolner, 2004). Animal cartoon characters have been used as models to depict human behaviors and emotions in children's literature (Zeece, 1998). Previous surveys with children have shown positive attitudes about nature and the environment (Bonnett & Williams, 1998).

Therefore, a focus on animal characters within their natural environment may provide motivation and reinforcement for learning about personal habits regarding nutrition and physical activity. Using animal characters indigenous to the region where children live may further enhance relevance and interest. The purpose of the study reported here was to test the effectiveness of a school-based Extension nutrition and physical activity education program that engaged children with relevant animal characters.

Project Description

The Go Wild with Fruits and Veggies program contained seven classroom lessons to increase intake of fruits and vegetables and physical activity among 3rd-5th grade children. The curriculum incorporated one wild animal character into each lesson, with factual information about the animals and their environment and behaviors. The wild animal was developed into a story character to model and reinforce nutrition and physical activity concepts based on reciprocal determinism, an important SCT construct, which proposes that behavioral, personal, and environmental factors interact to influence behavior. Intended outcomes included increased fruit and vegetable intake and physical activity (behavioral factors), greater liking and willingness to try new fruits and vegetables (personal factors), and helping with food preparation at home (environmental factors).

The program was taught in classrooms by Extension paraprofessionals using interactive, hands-on procedures. For example, at each lesson, students tried three different fruits or vegetables from one of five featured color groups and completed fun and engaging physical activities. The program was supported with additional educational opportunities for school food service personnel, teachers, and family members to reinforce systems change and create environmental conditions to facilitate behavior change. For example,

newsletters encouraged family participation by providing discussion questions based on what the child had learned in school as well as a specific take-home challenge to try or prepare a fruit or vegetable (e.g., add a blue fruit as part of breakfast). The Go Wild with Fruits and Veggies program was unique because of its combined emphasis on diet and physical activity, and the use of indigenous animals to generate interest and motivation among children.

Program Evaluation

The Go Wild with Fruits and Veggies program evaluation took place in two phases with 3rd-5th grade children during September-June, 2008-2009. Phase One involved rural children (n=1,285) who completed the program over 7 months followed by a brief post-questionnaire and journaling activities. Phase Two involved urban children (n=140) who completed the program over 7 weeks with an intensive dietary intake measurement. In the urban setting, a more comprehensive evaluation was possible that compared changes in fruit and vegetable intake between treatment and control groups to confirm results from the rural setting.

Evaluation Process: Phase One Rural Setting

Children in 15 school districts involving 60 3rd-5th-grade classrooms participated in the program in northwest Minnesota. The proportion of children eligible for free or reduced price school meals ranged from 50-62%. A questionnaire administered after the program asked children about behavior change relative to before the program. Children were asked to indicate whether they agreed (Yes or No) with four statements (e.g., Because I participated in Go Wild for Fruits and Veggies, I eat more fruit).

After the program, children also wrote journal responses to questions related to curriculum objectives. A random sample of 60 journal responses were transcribed verbatim and coded using ATLAS.ti qualitative data analysis software (ATLAS.ti, Scientific Software Development, Berlin, copyright 1991-2009, version 5.2). Sorted transcript segments were read for common themes according to the constant comparative method (Strauss & Corbin 1998). Common themes were confirmed by all researchers.

Evaluation Process: Phase Two Urban Setting

A quasi-experimental pre-post intervention comparison group design was used within three schools in St. Paul, Minnesota in one district. Two schools served as intervention schools and one as a control school (with delayed-intervention). Across the three schools, the percentage of minority enrollment and eligibility for free or reduced price school meals ranged from 63% to 87%. Girls made up 43% of the sample. The University of Minnesota Institutional Review Board and the school district research committee approved the project with parental consent and student assent procedures. Extension paraprofessionals implemented the program in classrooms as part of physical education classes or as an enrichment to regular classes on a weekly basis for 7 weeks between February and June, 2009.

A pre-post questionnaire was used to evaluate changes in outcome variables and usual physical activity based on reported typical activities completed the previous day (n=132 in seven classrooms in the intervention group and n=121 in six classrooms in the control group). Children were asked to indicate whether they agreed (Yes or No) with 11 statements (e.g., "I often help fix vegetables for meals and snacks at home," "Eating different kinds of vegetables can help me be healthy"). Change in fruit and vegetable intake was measured based on individual pre and post 24-hour dietary recalls (n=140) conducted by graduate student research assistants using Nutrition Data System for Research software (version 2009, Nutrition Coordinating Center, University of Minnesota). Comparisons before and after the intervention and between experimental groups were done using paired t-tests for continuous intake and activity score variables and nonparametric

tests for categorical variables (McNemar's test for paired pre-post observations). SAS software was used to make statistical comparisons (SAS Institute Inc., Cary, NC, USA, copyright 2002-2008, version 9.2).

Results: Phase One Rural Setting

Questionnaire results indicated that a majority reported positive behavior changes as follows.

- Tried more fruits and vegetables (n=1,054, 82%)
- Exercised more (n=1,015, 79%)
- Consumed more fruit (n=925, 72%)
- Consumed more vegetables (n= 732, 57%)

Journal responses indicated the following.

- In general, children had positive impressions regarding new fruits and vegetables with descriptors of good, sweet, juicy, soft, or crunchy used most often. Negative descriptors were more common for vegetables (weird, bitter, and dry).
- Most children provided general comments indicating fruits and vegetables and physical activity are good for you and will make you healthy. However, more specific examples indicated that fruits and vegetables provided phytochemicals and vitamins, which were associated with health benefits.
- Most children wrote about preparing or helping others prepare a fruit or vegetable dish or beverage (fruit smoothie, fruit or vegetable pizza, salad, soup/cooked vegetable, cut up fruit).
- Children indicated they either liked the process of tasting new fruits and vegetables or liked the new foods they tried. While some were fearful of trying new foods, they had positive impressions regarding the experience.

Children listed an animal character as their favorite because they liked the activity or the fruits and vegetables associated with the character during the program. For example:

- "Derek Deer loves red veggies and so do I now." (red),
- "Becky BlueBear because I like blueberries." (blue and purple),
- "Melany Moose because she likes green fruits and vegetables and I do to." (green),

- "Rosie Rabbit because I like orange fruits and vegetables like carrots and oranges." (orange),
- "Ricky Raccoon because he's a science biologist and when I grow up I want to be a biologist." (white), and
- "Tomas Turkey because I am always active like him." (yellow).

Results: Phase Two Urban Setting

- Before the intervention, most children in both the intervention and control groups were positive about liking (>90%) and willingness to try new fruits (>80%) and agreed that eating different kinds of fruits and vegetables could help them be healthy (90-98%). Positive baseline findings left little room for improvement over time.
- Fewer children indicated they liked most vegetables (57-63%) before the intervention with no differences pre and post intervention or between groups. After the intervention, the number of children in the intervention group indicating they liked to try new vegetables increased compared to the control group (p<0.04).
- Fruit intake increased in both groups from pre to post intervention (Table 1). Vegetable intake increased in the intervention compared to the control group (p<0.037). Combined intake of fruits and vegetables increased in the intervention group, however the differences between groups were not significantly different (p<0.083).
- Fiber intake and percentage of calories from fat and saturated fat improved in the intervention compared to the control group (p<0.05) (data not shown in table).
- No differences were noted in changes in reported physical activity between groups after the intervention (p<0.05).

Table 1.
Change in Mean Fruit and Vegetable Servings in an Urban Setting*

	Intervention Schools (n=69)		Control School (n=71)		Between group differences	p value
	Pre	Post	Pre	Post		
	Mean ± SD		Mean ± SD		Mean ± SD	
Total fruit	1.4 ± 2.0	1.7 ± 1.8	1.0 ± 1.6	1.3 ± 1.3	0.01± 2.1	0.975

Total vegetable	1.7 ± 2.1	2.1 ± 1.9	1.5 ± 1.7	1.2 ± 1.4	0.8 ± 2.2	0.037
Total fruit & vegetable	3.1 ± 3.0	3.8 ± 2.6	2.5 ± 2.4	2.5 ± 1.7	0.8 ± 2.7	0.083
*1/5 of recalls based on weekend intake and 4/5 on weekday intake.						

Implications

Evaluation findings from both rural and urban settings based on implementation of lessons over 7 months or 7 weeks documented effectiveness of the Go Wild with Fruits and Veggies program in improving diet quality of children based on children's self reported intakes. Results from both phases of the evaluation indicated children tried and consumed more vegetables. However, few changes were noted in the Phase Two urban setting, where a pre- post- design with a control group was used to measure changes in variables that may mediate an increase in intake such as liking, willingness to try, and frequency of preparing fruits and vegetables for meals or snacks.

Using animal characters indigenous to the region was helpful in both rural and urban settings to engage children's interest in learning about fruits and vegetables and physical activity. Journal responses from children in the rural setting indicated that the animal characters represented "human" situations so children could identify with the characters and their adventures. Journal entries indicated that families responded to the take-home challenges and that taste testing was well received by children and was an important part of the experiential learning process. The most engaging components of the curriculum were the "Go Wild" review games with questions regarding food, nutrition, and animal character scenarios; taste testing; and physical activities. An important factor that led to the success of the program was the enthusiasm classroom teachers, parents, food service staff, lesson presenters, and children demonstrated toward the program.

Implementation of nutrition and physical activity curricula using personally relevant animal characters can capitalize on children's innate interest in wild animals in their natural surroundings and serve to make Extension education relevant and enjoyable. If the project were replicated in another region, the curriculum could be revised to include wild animals indigenous to the region to maintain interest among children. Limitations include self-reported dietary intake data and use of a non-random sample of children, thus limiting the ability to generalize to a wider group of children.

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